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DEMOGRAPHICS HINDER ADOPTION OF WATER MANAGEMENT PRACTICES AMONG THE FARMERS OF PAKISTAN

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Water plays a pivotal role in the agricultural production which provides food and a source of income to the masses. Unfortunately the under-developed countries, including Pakistan, are facing the water scarcity related problems for which water management techniques are needed. Mere awareness of the water management practices would not resolve the issue of irrigational water scarcity until the farmers would adopt and get benefit from these practices. The present research was carried out to explore the adoption related demographic hindrances among the farmers. The associated links were derived by statistical methods to explore the dependence of adoption on socio-economic characteristics of the farmers. Simple random sampling technique was used to collect sample throughout the selection. Structured interviews were conducted for data collection. Chi-Square test was used for determining the relationship between adoption levels and demographics of the farmers. The adoption of the latest water management practices was found to be associated with selected socio-economic characteristics i.e. age, education, tenancy status, income of the respondents except size of landholding. Therefore, it is suggested that old aged farmers should be contacted to encourage the adoption of these practices through devoted extension services and education should be promoted at all levels. Last but not the least, credit should be provided to the farmers on easy terms and conditions for implementation of the water saving practices on farm level.
Keywords: Demographics, Adoption, Water Management, Punjab (Pakistan)

INTRODUCTION

Water scarcity is becoming an increasingly significant issue equally for all countries allover the world. The finite nature of freshwater resources presents a major challenge that is needed to overcome if these countries are to feed human beings to sustain economic growth plus environment. As a result, such countries will not have sufficient water resources to maintain their current level of per capita food production from irrigated agriculture unless they would have high levels of irrigation efficiency to meet reasonable water needs for their agriculture. In such alarming conditions, there is need to conserve the water, which is available for irrigation purposes and also should check the losses in this regard.

The declining natural resources and the scarcity of available water are strongly evident in Pakistan (Ashraf *et al.*, 2013). It does not have sufficient water resources to maintain their current level of per capita food production from irrigated agriculture and masses are unable to irrigate the cropping fields freely (Amir[1] *et al.*, 2013). The marginalized areas of the country have their existence only on the rain water and according to the estimates of the current year (2013) the upper areas are having lot of problems for the cultivation of the food crops (Amir, 2013). This does not bode well for the food security of the area as the winter has so far been dry throughout the year. Irrigation of wheat crop has been reported to be a leading problem as reported by Amir[2] *et al.* (2013) in the Punjab, Pakistan. Furthermore, the management at farm level irrigation is also having some problems and a large chunk of water is wasted in its system. Paltry investments in the irrigation system have increased the related problems. The lost of system's efficiency due to the same reason is another problem. This efficiency is maintained by de-silting the canals after every five years of duration (Khan, 2014).

For saving the world from the water shortages and food insecurity the developed strategies, generally made, overlap each other. There is need of a specific plan which covers the related challenges in single package. The measure has tendency to give the better strategy to meet on farm water scarcity as by 2025, the International Water Management Institute (IWMI) has estimated that one third population of the world is expected to live in countries, which will face water scarcity for their agriculture sector (Molden, 2001). Keeping in view the generality of the problem it has already been loaded into the global agenda.

This situation does not bode well for the agriculture and food security of the country. Pakistan is not the only country for having such problems many other countries are facing the same threats in this regard as indicated by Xu *et al.* (2013). There is need of high levels of irrigational efficiency in the country to meet reasonable water requirements of its agriculture. A ray of hope is in the brickening of the water channels which was identified to be under process in the country (Mahmood, 2011). In such alarming conditions there is a strong demand to conserve the water which is available for irrigation purposes. The awareness with the latest irrigation practices have already been reported to be important and varies with the different socio-economic features of the farmers (Muneer *et al.*, 2013) but there is dire need to check the losses by taking some immediate

practicable steps which may be possible in the form of adoption and implementation of the latest water management practices. That's why the present study was designed to investigate into the factors affecting adoption of water management practices by the farmers. In short, the findings of the study had been a great help to the extension workers, planners and policy makers for making improvements in the existing activities for the adoption of these practices by the farmers.

This lack of access to the latest information has also affected on the adoption of the efficient water management practices in context of laser land leveling among the farmers. The research was conducted with keeping two objectives in front;

- To appraise the adoption of water management practices by the farmers.

To determine the relationship of age, education, land tenure ship, size of landholding and income with the adoption of water management practices.

MATERIALS AND METHODS

The research was conducted in a randomly selected District of Punjab i.e. Vehari. One of the Tehsils; Burewala was further selected randomly. The sample was collected from the randomly selected five (5) Rural Union Councils (RUCs) from the area. From each of the RUC the total respondents taken at random were 25. The total sample size taken for the research was consisted of 125 respondents. A well structured interviewed schedule was prepared and employed after passing it through the phase of pre-testing in which it was tested on the ten (10) persons for its workability. Then necessary changes were introduced accordingly in consultation with the experts. The data were collected through personal interviews. Informed consent was taken from the respondents and confidentiality of their personal information was ensured prior to interview them. Following collection, the data were analyzed statistically. Chi-square ($\chi 2$) test was used to derive the relationship between some selected independent and dependent variables with the help of computer. It is calculated by using the following formula.

$$\chi^2_{Cal} = \sum\left(\frac{O-E}{E}\right)^2$$

O = Observed Value
E = Expected Value

RESULTS AND DISCUSSION

Precise use of scarce water resources of the country can essentially be materialized with latest water management practices i.e. laser land leveling for the available piece of land (Muneer *et al.*, 2013). The adoption of these practices is considered very important. It is evident from the results of the study that the adoption of the respondents to the water management practices changes with the change in their socio-economics. The related results are given below;

Table 1: Association between adoption of water management practices and socio-economic characteristics

Socio-economics	Chi-square	p-value	Gamma
Age	42.89	.000**	-.496
Education	16.93	.010*	.036
Size of landholding	2.63	.620^{NS}	-.037
Tenancy status	22.11	.002**	-.07
Income	26.03	.000**	.574 **

Adoption lowered with increasing age: The adoption of the latest irrigational practices was identified with respect to different demographic features of the respondents. Age was taken as first parameter in this regard. Age is the number of years a person has gone through in life and its decisive nature regarding the awareness of the latest information related to agriculture and water management has already been identified (Muneer *et al.*, 2013). The respondents were divided into three age categories; Young (up to 35), Middle (35-50) and Old (Above 50). The majority of the respondents were included in the middle aged category i.e. 35-50 the results were in consonance with those of Imran (2005) who found that majority (51%) of the respondents were middle aged category. The age categories were found to be having highly significant (p=.000**) association when it were derived through chi-square test. The Gamma value (=-.496) indicated the nature of the relationship between these variables to be negative which denoted that higher the age of the respondents the lower were their rate of adoption for the laser land leveling.

Data clearly indicates that young age respondents had more adoption as compare to middle and old age respondents. So the hypothesis "Higher the age of the respondents, lower will be the adoption about water management practices" was accepted. The old aged farmers of the local area did not take it as priority due to their conventional/ stereotypic behavior of not adopting any innovation. A large majority of the old farmers had low levels of adoption regarding the latest water management practices. Young and middle aged respondents had medium to high levels of adoption in a large majority. In short, the adoption of the latest water management practices clearly decreased with the rising age of the respondents. The findings are in line with that of Tehseen (1996) who found that the adoption of the agricultural innovations were clearly affected by the change in the age, the young group was more interested in that.

Adoption increased with the rise in the education levels: Education is generally considered to be the aggregate of all the processes which become the cause of bringing the desired changes among the human beings (Khandai *et al.*, 2011). For the current research different categories of education were set to identify the distribution of the respondents. These categories were set as illiterate, up to primary, primary to middle, Middle to matric and above. The chi-square value shows a significant association (p=.010*) between education of the respondents and their adoption level about water management practices. The gamma value (=.036) shows a positive relationship between the variables. So the hypothesis "Higher the

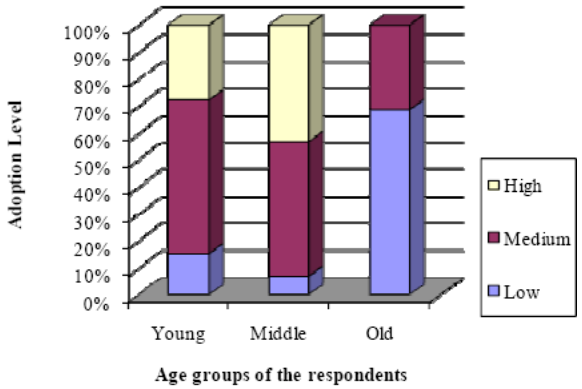

Figure 1: Association between age of the respondents and their adoption of water management practices

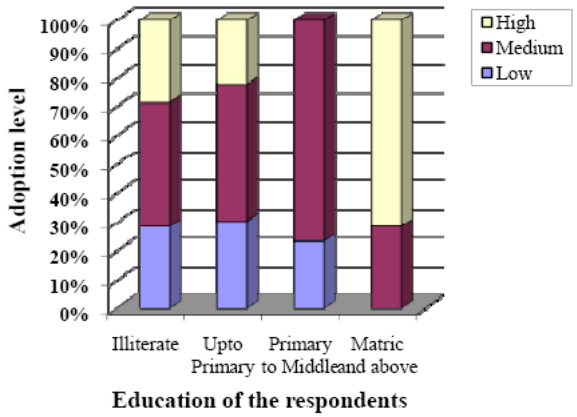

Figure 2: Association between education of respondents and their adoption of water management practices

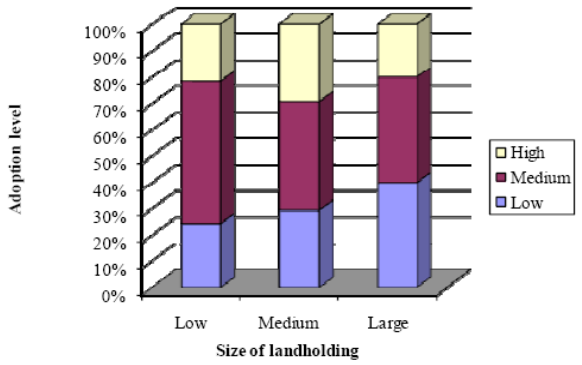

Figure 3: Association between size of land holding of respondents and their adoption of water management practices

education of the respondents, higher will be the adoption of water management practices" is accepted. The data indicate that education of the respondents was positively associated with the adoption of water management practices. Imran (1993) also found the same results and reported that there was found the positive association between education and the improvement of water management trends among the farmers. It was found that those who have improved their watercourses were comparatively more educated.

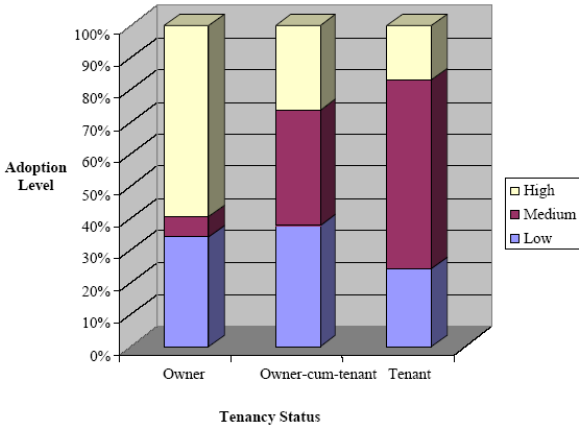

Figure 4: Association between type of land holding of respondents and their adoption of water management practices

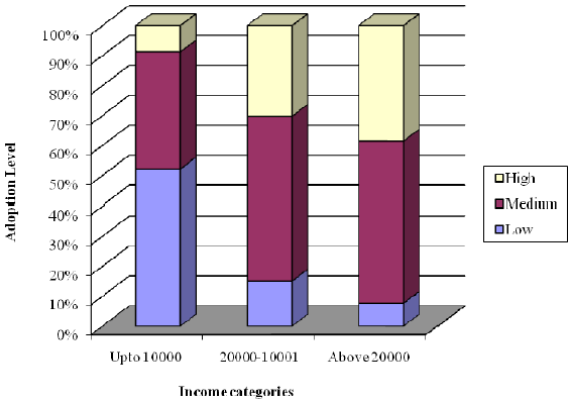

Figure 5: Association between income of respondents and their adoption of water management practices

The graphical representation of the data revealed another interesting finding. Rising with the educational level the level of adoption was also on the rise. On the other side the very low levels of adoption or lack of adoption dropped down to zero with the rise in education. This zero value shows that the respondents having matriculation or more than matriculation levels of education were not found to be in low level of adoption and they showed high levels of adoption in a large majority. Rather adoption rate among such respondents was found to be very high.

Adoption had no link with the size of landholding: Size of landholding means the piece of land cultivated by a farmer or his family and it is considered as one of the important factors, which affect the yield at farm (Amir, 2009; Muneer, 2007). It was, therefore, considered necessary to see the impact of size of landholding in the present study. The respondents had different sizes of landholdings; Size of landholding determined was small, medium and large. The chi-square value shows a non-significant (p=.620^{NS}) association between size of landholding of the respondents and their adoption level about water management practices. So the hypothesis "Higher the size of landholding of the

respondents, higher will be the adoption about water management practices" is rejected. It is found that majority of the farmers in the area was small landowners (having up to 5 acres of land). As far as, the adoption of the latest water management practices by these small farmers were concerned it was strongly evident that the majority of them had medium levels of adoption.

Adoption was more among the owner cultivators: Land tenure means the manner and condition of landholding or the proprietary rights of an individual to the land. In Pakistan most of farmers were owner cultivator, owner-cum-tenants, and tenants. Each respondent was, therefore, asked about his tenancy status (Muneer, 2007). Tenancy status of the respondents was graded into owner, owner-cum-tenant and tenant. The chi-square value shows a highly significant association (p=.002**) between tenancy status of the respondents and their adoption level about water management practices. The gamma value (= -.07) shows a negative relationship between the variables. So the hypothesis "there is an association between tenancy status and adoption about water management practices" is accepted.

Adoption was more among high income growers: The ultimate objective of the farmers is to sustain the livelihoods of their households that included income. If the farmers go to adopt the latest water management practices they will have to invest more money, it can increase their initial cost and decrease their profit margin. They may not adopt the beneficial technology due to the same complication. So the income levels of the respondents were identified to explore the adoption related complexities. Income levels of the respondents were up to Rs. 10000, 10001-20000 and Above 20000. The chi-square value shows a highly significant (p=.000**) association between income (after applying management practices) of the respondents and their adoption level about water management practices. The gamma value (= .574) shows a strong positive relationship between the variables with chi-square value 26.03. Data clearly indicates that high income respondents had more adoption as compare to the low income respondents. So, the hypothesis "Higher the income of the respondents, higher will be the adoption of water management practices" is accepted.

CONCLUSION

The adoption of the latest water management practices was linked with the selected socio-economic characteristics age, education, tenancy status and income of the respondents. Old aged farmers were not much interested in adoption of innovative practices. The adoption rate increased with the rise in education levels and income of the respondents. Furthermore, the farmers who were owner cultivator applied such latest practices more on their land than the owner-cum-tenants and the tenants. Adoption was not affected with the size of landholding in the study area.

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